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# Re-examining the Wagner's Law Versus Keynesian Hypothesis: Evidence from Nigeria

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**ABSTRACT.** This study investigates the Keynesian and Wagnerian views on public expenditure and economic growth in Nigeria using annual secondary data spanning from 1980 to 2011 obtained from the Central bank of Nigeria (CBN) statistical bulletins. The Augmented Dickey-Fuller (ADF), Johansen Cointegration and Granger Causality econometric methodologies were used in this study. The Johansen Cointegration test revealed the presence of a long-run cointegrated relationship between government expenditure (capital expenditure and recurrent expenditure) and economic growth (GDP) in Nigeria. The Granger Causality test found no mutual correlation between government expenditure (capital expenditure and recurrent expenditure) and economic growth (GDP) using the benchmark of 5% level of statistical significance. The findings of this study therefore indicate the non-existence of both Wagner's Law and Keynesian Hypothesis on public expenditure and economic growth in Nigeria during the period under review.

## 1. INTRODUCTION

The relationship between government expenditure and economic growth has become an important aspect of public finance. This study aims to provide an analyses and discussion of the two renowned opposite hypothesis (i.e. Keynesian hypothesis and Wagner's law) that are used in providing an explanation to the government expenditure and economic growth nexus.

The Wagner's law stipulates that public expenditure is an endogenous factor and an increase in government expenditure is as a result of an increase in national income. In other words, an increase in government expenditure is dependent on the extent of economic growth and expansion. Therefore the causality should run from economic growth to government expenditure, and hence concluding that government expenditure does not result to the generation of national income.

There are six empirical versions of Wagner's law Peacock and Wiseman (1961), Gupta (1967), Goffman (1968) , Pryor (1969), Musgrave (1969), Goffman and Mahar (1971) and Mann (1980), (Pahlavani, Abed and Pourshabi, 2011). These are summarised in Table 1:

**Table 1.** Six versions of Wagner's law

| Version | Model                           | Version                  |
|---------|---------------------------------|--------------------------|
| 1       | $LG = a_1 + a_2 LGDP$           | Peacock & Wiseman (1967) |
| 2       | $LC = a_1 + a_2 LGDP$           | Pryor (1969)             |
| 3       | $LG = a_1 + a_2 L(GDP/P)$       | Goffman (1968)           |
| 4       | $L(G/GDP) = a_1 + a_2 L(GDP/P)$ | Musgrave (1969)          |
| 5       | $L(G/P) = a_1 + a_2 L(GDP/P)$   | Gupta (1967)             |
| 6       | $L(G/GDP) = a_1 + a_2 LGDP$     | Mann (1980)              |

The Keynesian hypothesis postulates otherwise. According to this hypothesis, public expenditure is an exogenous and independent factor that enhances both short term and long term economic growth. The Keynesian hypothesis suggests that causality should run from public expenditure to national income. Furthermore, this hypothesis stipulates that government expenditure can be used as an expansionary fiscal policy to stimulate economic growth during economic depression.

This study will provide an empirical to re-examination of the Keynesian hypothesis and Wagner's law on government expenditure and economic growth in Nigeria.

## 2. LITERATURE REVIEW

There have been a plethora of empirical studies that have attempted to investigate the relationship between government expenditure and economic growth. The findings however have generated conflicting results. Loizides and Vamvoukas (2005) through the use of the trivariate causality test investigates the government expenditure and economic growth nexus in Ireland, Greece and the United Kingdom. The study finds the presence of causality running from government size to economic growth in all three countries studied, the result therefore is in concurrence with the Keynesian hypothesis. However, the study also indicates that with the inclusion of inflation, the causality runs from economic growth to public expenditure for Greece and United Kingdom, the findings in this case is in accordance with the Wagner's law.

In Nigeria, Aregbeyen (2006) empirically investigates the Wagner's law through the use of data spanning from 1970-2003 and finds a unidirectional causality running from economic growth to government expenditure, thus validating the presence of Wagner's law. Ram (1986) did not find any consistent causality between both variables in the 63 countries observed.

Muhlis and Hakan (2003) investigates the long-run relationship between public expenditure and economic growth in Turkey between the years 1965 to 2000 through the use of cointegration and Granger Causality tests and found the absence of both Keynesian hypothesis and Wagner's law in Turkey.

Liu and Hsu and Younis (2008) examines the direction of causality between public expenditure and GDP in the United States for the period 1947 to 2002 and finds a causal relationship running from government expenditure to economic growth, validating the Keynesian hypothesis for the United States. This result is similar to the study of Dogan and Tang (2006) which finds a unidirectional relationship between public expenditure and economic growth in Philippines during the period under review 1960 to 2002. However, the study failed to validate the presence of both the Keynesian hypothesis and Wagner's law in the other observed countries Thailand, Singapore, Malaysia and Indonesia during the same period under review.

In a more recent study, Rehman et al., (2010) investigates the public expenditure-national income nexus in Pakistan on data spanning from 1971 to 2006 through the adoption of the Toda-Yamamoto causality test. The finding suggested a unidirectional causality running from national income to public expenditure, which is in concurrence with the Wagner's law. However, using the same econometric method of the Toda-Yamamoto causality test, Sevietenyi (2012) finds the nonexistence of the Wagner's law in Nigeria.

In an investigation of the government expenditure and economic growth nexus on a selected 30 OECD countries in the period between 1970 and 2005 Olugbenga and Owoye (2007) finds a unidirectional causal relationship running from government expenditure to economic growth in 16 countries, thus following the Keynesian hypothesis. However, 10 countries depicted a causality running from economic growth to government expenditure, and hence supporting the Wagner's law.

In a study of the Malaysian economy, Samudram, *et al.* (2009) through the use of Auto-Regressive Distributed Lag approach to cointegration finds that both the Keynesian and Wagnerian views on public expenditure and economic growth are in existence in the observed country in the long-run.

Based on the aforementioned empirical literature on the Keynesian and Wagnerian views on public expenditure and economic growth, it can be observed that there is yet a concurrence. This study will therefore contribute to the existing literature by further investigating the government expenditure and economic growth nexus in Nigeria.

### 3. METHODOLOGY

In the quest to examine both the Keynesian and Wagnerian views on public expenditure and economic growth in Nigeria, this study will employ the use of the Johansen Cointegration and Granger Causality tests to investigate the long-run and causal relationship between government expenditure and economic growth in Nigeria in the observed period 1980 to 2011. The data used in this study are obtained from the various statistical bulletins of the Central Bank of Nigeria (CBN). The variables for this study are Gross Domestic Product (GDP), Recurrent Expenditure (REXP) and Capital Expenditure (CEXP). The regression model that is used for this study is:

$$\ln \text{GDP} = \beta_0 + \beta_1 \ln \text{REXP} + \beta_2 \ln \text{CEXP} + \varepsilon_t \quad (1)$$

where,

$\ln \text{GDP}$ : signifies Gross Domestic Product (in Naira),

$\ln \text{REXP}$ : indicates Foreign Direct Investment inflow (in Naira),

$\ln \text{CEXP}$ : connotes Gross Fixed Capital Formation (in Naira),

$\beta_0$ : signifies to the Intercept,

$\beta_1$  to  $\beta_2$ : signifies the coefficients of both explanatory variables,

$\varepsilon_t$ : is the error term.

All the variables have been transformed into the natural log form.

#### Unit Root Test Result

According to Engle and Granger (1987), the application of the unit root test is to prevent the estimation of spurious regression. In simple terms, the unit root test is used to examine the data series in order to find out whether they are stationary or not. To achieve this, this study adopts the Augmented Dickey-Fuller (ADF) test using this estimation model:

$$\Delta y_t = a_0 + a_1 y_{t-1} + \sum_{i=1}^n a_i \Delta y_{t-i} + e_t \quad (2)$$

$$\Delta y_t = a_0 + a_1 y_{t-1} + \sum_{i=1}^n a_i \Delta y_{t-i} + \delta_t + e_t \quad (3)$$

Where,  $y_t$  denotes the time series,  $\Delta$  connotes first difference operator,  $n$ ; refers to the number of lags in dependent variable; and  $e_t$  is the error term in the equation.

**Table 2.** Summary of the ADF Unit Root Test

| Variables         | Constant        | Constant and Trend | Order of Integration |
|-------------------|-----------------|--------------------|----------------------|
| $\ln \text{GDP}$  | -33.86 (0.00)** | -38.24 (0.00)**    | 1(0)                 |
| $\ln \text{REXP}$ | -7.76 (0.00)**  | -7.65 (0.00)**     | 1(0)                 |
| $\ln \text{CEXP}$ | -6.36 (0.01)**  | -6.28 (0.00)**     | 1(0)                 |

**Note:** \*\* and \*\*\* indicates the rejection at 5% level of significance. The parenthesized figures are the p-values and the t-statistics are the figures outside the parenthesis. Source: Computed by the author using Eviews 8.0

The result of the ADF test is determined by comparing the absolute terms of the MacKinnon and ADF test statistics values. In the situation whereby the absolute value of the ADF test statistics is greater than each of the absolute MacKinnon values, the variable will be deemed to be Stationary. However, if otherwise, the variable will be adjudged to be non-stationary. The null hypothesis for the ADF test is that each variable  $\ln GDP$ ,  $\ln REXP$  and  $\ln CEXP$  have unit root and are non-stationary whereas the alternative hypothesis connotes that each of the variable do not have unit root and are therefore stationary. According to the result presented in Table 2, the null hypothesis is rejected meaning that all three variables are stationary and integrated in order one,  $I(0)$ .

### Johansen Cointegration Test

Having found that each variable are stationary and integrated in order one,  $I(0)$ . The Johansen Cointegration test is conducted in order to examine the long-run relationship between government expenditure and economic growth in Nigeria. The result of the cointegration test presented in Table 3 shows both the Trace test and Max-eigen value test. The result of both tests suggest the rejection of the null hypothesis and concludes that there is the presence of a long-run cointegrated relationship between economic growth (GDP) and the explanatory variable (REXP and CEXP) in Nigeria.

**Table 3.** Cointegration test results of Nigeria's economic growth model.

| Hypothesized No. of CE(s) | Trace Statistics | 0.05 critical value | Prob. | Max-eigen Statistics | 0.05 critical value | Prob. |
|---------------------------|------------------|---------------------|-------|----------------------|---------------------|-------|
| None                      | 52.89**          | 47.87               | 0.00  | 27.80**              | 21.13               | 0.00  |
| At most 1                 | 25.09**          | 15.49               | 0.00  | 16.41**              | 14.26               | 0.02  |
| At most 2                 | 8.67**           | 3.84                | 0.02  | 8.67**               | 3.84                | 0.00  |

Note: \*\* indicates the rejection at 5% level of significance.

Source: Computed by the author using Eviews 8.0

### Granger Causality Test

The Granger Causality test is carried out to investigate the causal linkage between GDP and government expenditure (capital expenditure and recurrent expenditure). The result of the granger causality test is presented in table 4:

**Table 4.** Pair Wise Granger Causality Tests

| Null Hypothesis:                 | observation | F-Statistic | Probability | Decision            |
|----------------------------------|-------------|-------------|-------------|---------------------|
| REXP does not Granger Cause GDP  | 29          | 0.36        | 0.69        | Fail to Reject Null |
| GDP does not Granger Cause REXP  | 29          | 1.41        | 0.26        | Fail to Reject Null |
| CEXP does not Granger Cause GDP  | 28          | 3.06        | 0.07        | Fail to Reject Null |
| GDP does not Granger Cause CEXP  | 28          | 1.18        | 0.33        | Fail to Reject Null |
| REXP does not Granger Cause CEXP | 28          | 1.11        | 0.35        | Fail to Reject Null |
| CEXP does not Granger Cause REXP | 28          | 0.25        | 0.78        | Fail to Reject Null |

\*\* indicates the rejection at 5% level of significance.

Source: Computed by the author using Eviews 8.0

The result from table 4 suggests the rejection of the null hypothesis at the 5% level of significance. This means that there is the absence of mutual correlation between economic growth (GDP) and the explanatory variables (capital expenditure and recurrent expenditure). In other words, this study finds the absence of both Keynesian hypothesis and Wagner's law in Nigeria. The result of this finding is in concurrence with those of Muhlis and Hakan (2003) and Sevietenyi (2012) for Turkey and Nigeria respectively.

#### 4. CONCLUSION

This paper investigated the Keynesian and Wagnerian views on public expenditure and economic growth in Nigeria using annual secondary data spanning from 1980 to 2011 obtained from the Central bank of Nigeria (CBN) statistical bulletins. The econometric methodology adopted in this study were the Johansen Cointegration and the Granger Causality tests. The results from this study despite finding a long-run relationship between government expenditure and economic growth, found no mutual correlation between both variables and hence indicating the absence of both Wagner's Law and Keynesian Hypothesis on public expenditure and economic growth in Nigeria

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